REMOTE CONTROL HANDSWITCH AND OPERATING METHOD THEREOF FOR PORTABLE X-RAY UNITS USABLE METHOD

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a remote control handswitch for a portable X-ray unit, and in particular to a remote control handswitch for a portable X-ray unit capable of achieving a multifunction operation based on a click operation of a two-step switch.

2. Description of the Background Art

A conventional portable X-ray unit is classified into a fixed type and a mobile type based on a state that it is portable or not. The portable X-ray unit represents a portably movable X-ray unit that does not have any limit for the place of use.

In addition, a controller capable of controlling a conventional X-ray photographing apparatus is adapted to properly adjust a tube voltage by an input voltage adjusting unit, and a direct or indirect photographing operation is selective. An exposure degree of an X-ray is properly set. There is provided a numbering display unit. An operator controls all functions of a photographing apparatus using

a controller through a microphone connected with a speaker in the side of a camera obscura.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a remote control handswitch for a portable X-ray unit capable of achieving a multifunction operation based on a click operation of a two-step switch of a remote control handswitch.

To achieve the above objects, there is provided a remote control handswitch for a portable X-ray unit comprising a two-step switch formed of a standby button and an execution button, and a handswitch housing having the two-step switch on an upper side of the same, wherein a multi-function operation is performed based on a click operation of the two-step switch.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become better understood with reference to the accompanying drawings which are given only by way of illustration and thus are not limitative of the present invention, wherein;

Figure 1 is a view illustrating a remote control handswitch for a portable X-ray unit according to the present invention;

Figure 2 is a perspective view illustrating a remote control handswitch

according to the present invention;

Figure 3 is a flow chart of a preset memory selection method according to the present invention;

Figure 4 is a flow chart of a kV-setting change method based on a kV, mAs setting change method according to the present invention;

Figure 5 is a flow chart of a mAs setting change method according to the present invention;

Figure 6 is a flow chart of a collimator on and off selection method according to the present invention;

Figure 7 is a flow chart of an on and off selection method of a laser point lighting according to the present invention; and

Figure 8 is a flow chart of a filament heating and an X-ray unit execution method according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A remote control handswitch for a portable X-ray unit according to the present invention can achieve a multifunction operation based on a pressing time and number of a standby button and an execution button of a press button unit.

In a portable X-ray unit, a remote control switch function using a handswitch is capable of controlling a kV, mAs setting and a memory selection or a collimator lamp on and off operation and a laser pointer lighting operation. Only a

standby button is used for performing a remote control using a handswitch.

In order to use a remote control mode, a standby button of a handswitch is pressed by a series triple click operation. After a completion of the operation, the mode is switched to a remote control mode of the handswitch. When the remote control mode is performed, the LEDs displaying the storing number of the preset memory are sequentially turned on and off. The LEDs displaying the kV and mAs values stored in each memory are sequentially blinked and continuously scrolled. In the above continuous scroll, in order to select a desired memory, the kV and mAs values stored in the memory number are displayed by pressing the standby button one time at the time when the LED of the storing number is turned on.

The just earlier data is stored and displayed as the values of all preset memory.

After the memory selection, the changing method of the kV value is performed based on a continuous triple click operation using the standby button of the handswitch like a method for performing a remote control mode. After the standby switch is continuously triple clicked, when the kV display LED is blinked after the memory storing number LED, the kV selection mode is displayed by pressing the standby button of the handswitch one time. In the kV selection mode, the kV value is increased by pressing the standby button of the handswitch one time. In addition, the LED of the kV value is fast blinked by continuously pressing the standby button of the handswitch, representing that the kV value is fast

increased or is fast decreased. In a state that the standby button is continuously pressed, when the kV value is displayed, and the standby button of the handswitch is pressed, it is possible to select a corresponding kV value. After the kV value is selected, the kV values are automatically set up for a few seconds.

After the kV value is set up, the changing method of the mAs value is similar with the change of the kV value. The standby button of the handswitch is triple clicked like the method for performing the remote control mode. After the standby button is clicked three times, the kV display LED is blinked after the memory LED, and the mAs LED is blinked. When the standby button of the handswitch is clicked one time, the current mode is switched to the mAs selection mode. In the kV selection mode, the mAs selection mode is automatically performed after the kV value is set up. In the mAs selection mode, the standby button of the handswitch is clicked one time, so that the mAs value is increased by one step. When the standby button of the handswitch is continuously pressed, the LED displaying the mAs value is fast blinked for displaying the fast increase of the values or the fast decrease of the values. In a state that the standby button is continuously pressed, when stopping the pressing state of the standby button of the handswitch, it is possible to select a desired mAs value at the stop point. After the mAs velue is selected, the mAs value is automatically set up after a few seconds.

In order to turn on or off the lighting of the laser pointer using the remote

control handswitch of the portable X-ray unit, the standby button of the two-step switch is pressed two times, the lighting of the laser pointer is turned on. After the lighting of the laser pointer is turned on, the lighting of the laser pointer is automatically turned off after 30 seconds.

In addition, after the X-ray unit is performed, the lighting of the laser is automatically turned off.

In order to turn on the collimator using the remote control handswitch of the portable X-ray unit, the standby button of the two-step switch is pressed two times, so that the collimator is turned on. The collimator us automatically turned off in 30 seconds after the collimator is turned on.

In the portable X-ray unit, the turning on and off operations of the laser pointer, the lighting and the collimator may be concurrently performed by the same operation method.

When the collimator is turned on, the filament is heated by pressing the same for a second. When the collimator is turned off, the filament is heated in 0.8 seconds by pressing the standby button for a second. After the filament is heated, the mode becomes a standby state, and the X-ray unit gets standby.

In the two-step switch unit, the pressing operation for a second represents a button press for a short time period, and the pressing operator for a long time period represents a state that the button is pressed until the mode is selected to the selection mode. In the pressing operation for a second, the idle time is within

0.8 seconds when continuously pressing the button two times or three times.

The preferred embodiments of the present invention will be described with reference to the accompanying drawings.

Figure 1 is a view illustrating the construction of the portable X-ray unit 100 according to the present invention, and Figure 2 is a perspective view of the remote control handswitch 2 of the portable X-ray unit 100 of Figure 1. A two-step switch 4 is installed on an upper side and is formed of a standby button 6 and an execution button 8 for achieving a multifunction operation based on a click operation.

As shown in Figure 3, in an operation of the remote control handswitch of the portable X-ray unit according to the present invention, the standby button of the two-step switch is triple clicked three times in series, so that the current mode is switched to the remote control mode. After the mode is switched to the remote control mode, the remote control mode is executed. After the remote control mode is executed, the storing number LED of the preset memory are sequentially displayed. The LEDs corresponding to the kV values and mAs value of each memory are sequentially blinked. The storing number LED of the preset memory and the LED displaying the kV value and mAs value stored in the storing number are continuously scrolled. In the above scroll step, at the time when the LED of the storing number is turned on, when the standby button is pressed one time, the kV value and mAs value stored in the memory number are displayed.

As shown in Figure 4, when the standby button of the two-step switch unit is pressed three times (triple clicks), the current mode is switched to the remote control mode. After the mode is changed to the remote control mode, the remote control mode is executed. After the remote control mode is executed, the storing number LEDs of the preset memory are displayed. After the storing number LEDs are sequentially displayed, when the LEDs displaying the kV value and mAs are sequentially blinked, the standby button is pressed for a second one time. After the standby button is pressed one time, the mode is switched to the kV selection mode. The kV value is increased by one step when the standby button is pressed one time. When the standby button is continuously pressed in a pressed state, the LEDs displaying the kV value shows a fast increasing value or a fast decreasing value. In the step in which the kV value is increased by one step, in the case that a desired kV value is displayed on the LED, the kV value is automatically stored in a few seconds. When the standby button is continuously pressed in a pressed state, the LEDs display the fast increasing values and fast decreasing values. In the above procedure, when a desired kV value is displayed on the LED, and the standby button is released at that time, a corresponding kV value is selected. In the step for selecting the kV value, the kV value is automatically stored in a certain time period.

Figure 5 is a flow chart of a mAs setting change method based on the kV and mAs setting change methods according to the present invention.

Figure 6 is a flow chart of an on and off selection method of the collimator according to the present invention. The first standby button 6 of the two-step switch 4 of the remote control handswitch 2 is pressed two times within 0.8 seconds, the collimator is turned on and off. When the execution button 8 is pressed for a second, the collimator is turned off.

Figure 7 is a flow chart of an on and off selection method of the laser pointer lighting according to the present invention.

Figure 8 is a flow chart of an execution of an X-ray when the filament is heated. As shown therein, when the collimator 6 is turned on, and the standby button 6 of the two-step switch 4 of pressed, the filament is heated. When the collimator is turned off, and the standby button 6 is pressed, the filament is heated in 0.8 seconds. After the filament is heated, the mode becomes a ready mode. The X-ray unit is performed.

As described above, in the present invention, it is possible to achieve a multifunction operation based on the time and number of the clicks of the standby button 6 and the execution button 8 of the two-step switch of the remote control handswitch. Namely, in the present invention, the filament heating operation, the collimator turn-on operation, the collimator turn-off operation, the APR memory selection, the storing number selection operation, and the kV and mAs selection change operations are possible based on each operation method.

As the present invention may be embodied in several forms without

departing from the spirit or essential characteristics thereof, it should also be understood that the above-described examples are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its spirit and scope as defined in the appended claims, and therefore all changes and modifications that fall within the meets and bounds of the claims, or equivalences of such meets and bounds are therefore intended to be embraced by the appended claims.